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Claims

[c1] 1. A method of manufacturing electric machines, the method comprising:
a.) kinetically spraying an admixture comprising a permanent magnet powder and a soft magnetic binder onto a first substrate to form permanent magnetic elements on the first substrate;
b.) introducing persistent magnetization into the magnetic elements through application of concentrated magnetic fields of sufficient strength to cause magnetic dipole alignment in the deposited material; and
c.) forming planarized coils onto a second substrate by said kinetic spraying process, the second substrate being electrically insulating and adjacent to the first substrate.

[c2] 2. The method of claim 1 wherein the planarized coils are adapted to develop an electric voltage in the presence of a magnetic field acting therefore as a generator.

[c3] 3. The method of claim 1 wherein the electric machine is adapted to develop an electromagnetic torque through application of an electric current, thereby creating a motor.

[c4] 4. The method of 1 wherein the permanent magnetic powder is selected from the group consisting of iron, nickel, cobalt, samarium-cobalt, AlNiCo, neodymium iron boron, and samarium iron nickel.

[c5] 5. The method of 1 wherein the soft magnetic binder is selected from the group consisting of iron, nickel, cobalt, and alloys of these materials.

[c6] 6. The method of 1 wherein particles in the soft magnetic binder are individually coated with oxide films, organic films or polymeric films to provide a resistance to eddy current flow between adjacent particles and hence reduce core loss in presence of varying magnetic field.

[c7] 7. The method of 1 wherein the planarized coils comprise a component selected from the group consisting of copper and its alloys, aluminum and its alloys, silver, and gold.

[c8] 8. The method of 1 wherein the first substrate is a soft magnetic material whose function is to internally direct magnet flux, thereby producing a controlled magnetic flux pattern emanating from a free surface of the applied admixture.

[c9] 9. The method of 1 wherein the second substrate is an electrically and magnetically insulating material.

[c10] 10. The method of 1 wherein the second substrate consists of a soft magnetic material insulated from the coil by a film of electrically insulating material.

[c11] 11. An electric machine made by the method of claim 1.

[c12] 12. A method of manufacturing electric machines, the method comprising:
a.) kinetically spraying admixture of permanent magnet powders in a ductile, soft magnetic or non-magnetic matrix onto a first substrate to form permanent magnetic elements on the first substrate;
b.) introducing persistent magnetization into the magnetic elements through application of concentrated magnetic fields of sufficient strength to cause magnetic dipole alignment in the deposited material; and
c.) placing one or more coils adjacent to the first substrate.

[c13] 13. The method of claim 12 wherein the one or more coils are adapted to develop an electric voltage in the presence of a magnetic field acting therefore as a generator.

[c14] 14. The method of claim 12 wherein the electric a machine is adapted to develop an electromagnetic torque through application of an electric current, thereby creat-

ing a motor.

[c15] 15. The method of 12 wherein the permanent magnetic powder is selected from the group consisting of iron, nickel, cobalt, samarium-cobalt, AlNiCo, neodymium iron boron, and samarium iron nickel.

[c16] 16. The method of 12 wherein the soft magnetic binder is selected from the group consisting of iron, nickel, cobalt, and alloys of these materials.

[c17] 17. The method of 12 wherein the soft non-magnetic binder comprises copper.

[c18] 18. The method of 12 wherein particles in the soft magnetic binder are individually coated with oxide films, organic films or polymeric films to provide a resistance to eddy current flow between adjacent particles and hence reduce core loss in presence of varying magnetic field.

[c19] 19. The method of 12 wherein the first substrate is a soft magnetic material whose function is to internally direct magnet flux, thereby producing a controlled magnetic flux pattern emanating from a free surface of the applied admixture.

[c20] 20. An electric machine made by the method of claim 12.

[c21] 21. A method of manufacturing electric machines, the

method comprising:

a.) kinetically spraying an admixture comprising a permanent magnet powder and a soft magnetic binder onto a first substrate to form a first electric machine component comprising permanent magnetic elements on the first substrate;

b.) introducing persistent magnetization into the magnetic elements through application of concentrated magnetic fields of sufficient strength to cause magnetic dipole alignment in the deposited material;

c.) kinetically spraying a powder of iron, nickel, cobalt or alloy thereof to form a second electric machine component; and

d.) forming planarized coils on a second substrate by a kinetic spraying process, the second substrate being electrically insulating and adjacent to the first substrate.

[c22] 22. The method of claim 21 wherein the planarized coils are adapted to develop an electric voltage in the presence of a magnetic field acting therefore as a generator.

[c23] 23. The method of claim 21 wherein the electric machine is adapted to develop an electromagnetic torque through application of an electric current, thereby creating a motor.

[c24] 24. The method of 21 wherein the permanent magnetic

powder is selected from the group consisting of iron, nickel, cobalt, samarium-cobalt, AlNiCo, neodymium iron boron, and samarium iron nickel.

[c25] 25. The method of 21 wherein the soft magnetic binder is selected from the group consisting of iron, nickel, cobalt, and alloys of these materials.

[c26] 26. The method of 21 wherein the planarized coils comprise a component selected from the groups consisting of copper and its alloys, aluminum and its alloys, silver, and gold.

[c27] 27. An electric machine made by the method of claim 21.